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TITLE:

⑥ On refining the working formulas of a digital differential analyzer

PERIODICAL:

⑤ Akademiya nuak Gruzinskoy SSSR. Soobshcheniya, v.29, no. 5, 1962, 513-520

TEXT:

General formulas are given for the contained register of the integrator of a digital differential analyzer and for the output signal with increment of the independent variable ± 1 . The formulas for the contained register R_i and the output signal dz_i should have compact and similar forms, and must give an exact answer without any additional analysis. The formulas of Yu.A. Arkhangel'skiy and R.D. Bachelis (Trudy NII MPA SSSR, v. 2. no. 56, M., 1958) for R and dz_i are cited. These are conditional, and their use will necessitate additional analysis. Using the idea of a 'computer supplement' (CS) of positive numbers, the author derives the formulas

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$$R_i = 2 - (R_{i-1} + Y_i dx_i)_{cs} \quad (4)$$

$$dz_i = R_{i-1} + (2 - Y_i dx_i)_{cs} + (R_{i-1} + Y_i dx_i)_{cs} - 2 \quad (5)$$

where the component $Y_i dx_i$ expresses not the computer value transmitted from the Y register to the R register in the i th stage of the integration, but the algebraic value obtained by ordinary multiplication. In order to check all possible cases of the working of a digital differential computer in relation to the author's formulas and those of Arkhangel'skiy and Bachelis it is supposed that the increment of the independent variable takes place arbitrarily. The values in the Y-register, Y_i , at each stage of the integration and the corresponding values of dx_i , computer and algebraic values of $Y_i dx_i$ and the values of R_i , dz_i are given in tabular form. Hence it is shown that whereas the probability of error for the formulas of Arkhangel'skiy and Bachelis is extremely large, use of the author's formulas will always give an exact result without any additional analysis connected with the working of the analyzer. The 1st, 2nd, 3rd and 10th stages of the integration are considered, Card 2/3

and the use of the new formulas for investigations of a theoretical nature is indicated. There is 1 table.

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